

REMARKS

Claim 1 is amended by incorporating the subject matter of claim 4. Claims 4 and 6 are canceled herein. Support for the Amendment is found, for example, on page 3, line 25 of the specification.

I. Claim Rejections under 35 U.S.C. § 112, 2nd Paragraph

Claims 1 and 2 are rejected under 35 U.S.C. § 112, 2nd paragraph, as allegedly being indefinite because of the recitations of the words "thin" and "fast, which the Examiner states are relative terms not defined by the claims or the specification.

Claim 3 is rejected under 35 U.S.C. § 112, 2nd paragraph, as allegedly being indefinite because of the recitation of the word "fast", which the Examiner states is a relative term not defined by the claims or the specification.

Claims 4 and 5 are rejected under 35 U.S.C. § 112, 2nd paragraph, as allegedly being indefinite based on the recitation of the word "thin", which the Examiner states is a relative term not defined by the claims or the specification.

Applicants respectfully traverse the rejections under 35 U.S.C. § 112, 2nd paragraph, for the reasons of record. Namely, the terms "fast" and "thin" are part of the phrase "thin-layer revolving fast stirring apparatus", which is defined in the present specification (e.g., at page 3, lines 20-23 and 25) such that one of ordinary skill in the art can readily ascertain the meaning and scope of the claims when properly read in light of the specification. Further, it is disclosed at page 3, lines 26-30 that such apparatuses are known and commercially available. Even

further, Applicant is entitled to be his own lexicographer and it is improper for the Examiner to ignore the definitions of elements of the claimed invention that are set forth in Applicant's specification and to redefine Applicant's claimed invention.

Further, claim 1 is amended to recite the circumferential speed at which liquid A and liquid B are mixed to further define the claimed process.

Accordingly, Applicants respectfully request withdrawal of the rejections under 35 U.S.C. § 112, 2nd paragraph.

II. Claim Rejection – 35 U.S.C. § 103

Claims 1 and 3-7 are rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Matsufuji et al (US 5,064,687) in view of Schunemann et al and Asa (JP 2000-354751).

Applicants respectfully traverse the rejection and submit that the cited references, whether taken alone or in combination, do not teach or suggest the presently claimed invention.

The presently claimed invention is directed to a method for producing a magnetic recording medium having a nonmagnetic substrate coated with a magnetic coating material containing a ferromagnetic powder and a binder, wherein the magnetic coating material contains a liquid A constituted by the ferromagnetic powder and a solvent, and a solution B of the binder. The liquid A and the solution B are mixed together by a thin-layer revolving fast stirring apparatus at a circumferential speed of 25 m/sec or greater and is thereafter subjected to dispersion processing.

Matsufuji discloses a method of dispersing a kneaded and diluted mixture by adding a binder and a solvent to the ground mixture of ferromagnetic grains and a surface treating agent, and after mixing the ferromagnetic grains and the surface treating agent, grinding (dry type) the resulting mixture.

Schunemann discloses a method and a condition of kneading by using a continuous kneader (a kneading apparatus).

Masaki exemplifies various kneading apparatuses and dispersion apparatuses in the specification paragraph (0065) but the cited method is dispersing after kneading including the exemplified embodiment.

The present invention defines the method of the initial mixture and contact of the ferromagnetic powder with a binder by stirring in a thin-layer revolving fast stirring apparatus instead of by kneading. The present invention is different from the conventional kneading method in that the powder is dispersed by shear force and the binder is adsorbed at the same time. The present invention is characterized in that liquid A constituting the ferromagnetic powder and a solvent, and the binder solution B are mixed at a high speed and in a short time by the thin-layer revolving type fast stirring apparatus after liquid A is well dispersed well. It is not effective unless the liquid A is well dispersed. Therefore, even if one of ordinary skill in the art would have been motivated to put the ferromagnetic powder, the binder and the solvent in the thin-layer revolving-type fast stirring apparatus (a point which Applicants do not concede), the results of the present invention would not be achieved and handling problems such as powder deposits in the vessel of the apparatus are caused.

The present invention is defined clearly as described in the specification and provides unexpectedly superior effects which cannot be achieved based on the teachings of the cited references, whether taken alone or in combination. According to the present invention, since liquid A constituting the ferromagnetic powder and a solvent can be mixed with solution B of the binder by the thin-layer revolving-type fast stirring apparatus, particles of the ferromagnetic powder can be dispersed. Thus, coagulation of the ferromagnetic powder can be prevented, thereby making it possible to obtain a liquid mixture containing particles of the ferromagnetic powder with uniform adsorption of the binder. As a result, a magnetic coating material suitable for a low-noise high-density coating-type magnetic recording medium is obtained. This is a distinguishing feature of the present invention which allows for improved coating of a magnetic recording medium.

The function of the thin-layer revolving-type fast stirring apparatus 40 is disclosed in the specification. In the thin-layer revolving-type fast stirring apparatus 40, the processing object liquid (Liquid A and solution B) is pushed against the inner wall of the stirring tank 44 by a centrifugal force to form a thin layer with the thickness of about 12 to 18 mm. This thin-layer forms into a circulation fluid by upper and lower revolving streams when contacting the inner wall of the stirring tank 44.

On the other hand, the stirrer 46 is designed so that it cuts across the thin layer, and the revolving stream of the processing object liquid under processing passes through a large number of pores of the stirrer 46, and thereby repeatedly collides against the inner wall of the stirring tank 44 many times. By this collision, coagulated particles are dispersed to reduce the cluster size. Also, the dispersed particles are rolled on the inner wall face of the stirring tank 44

by the revolving stream of the processing object liquid, and are thereby subjected to rolling and granulation.

According to the mechanism described above, two types of particles, namely dispersed particles and granulated particles, are mixed uniformly while the dispersing of coagulation and granulation are repeated in the mixture containing particles of the ferromagnetic powder and the binder.

According to the mechanism of the thin-layer revolving-type fast stirring apparatus described above, it is preferable that a fast stirring condition (e.g., circumferential speed of 40 to 50 m/second) is reached in short time so that the particles are caused to collide against the inner wall of the stirring tank 44 under a great centrifugal force, which increases the dispersing force. It is the first time to achieve the results of the present invention by employing the thin-layer revolving-type fast stirring apparatus. Thus, the present invention is not obvious over the cited references.

III. Conclusion

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

AMENDMENT UNDER 37 C.F.R. §1.114(c)
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Respectfully submitted,

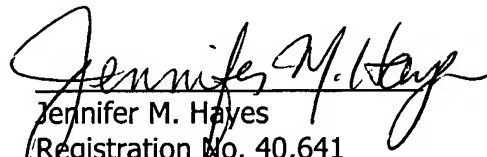
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